

THE MALE GENITALIA OF CUPES CONCOLOR WESTW. (COLEOPTERA).

BY F. MUIR.

HONOLULU, T. H.

In the Transactions of the Entomological Society of London, Dr. David Sharp and the present writer described the male genitalia and last abdominal segments of *Cupes clathratus* Motsch* (Japan). The material at our disposal was old and the membranous connections between the segments not at all intact. We described a unique structure which we marked f in our figures and considered it as an internal development of the ninth tergite. Thanks to the kindness of Dr. R. J. Tillyard, I have recently been able to examine a male of the American *Cupes concolor* Westw. and find that the above mentioned structure which we left unidentified is plainly the ninth sternite. Although there are small specific differences between the genitalia of the American and Japanese species, in all essential features they are similar, showing that a very close relationship exists between these two northern species. It is to be hoped that the male genitalia of the Australian species will shortly be described and figured.

To anyone familiar with the genitalia of Mecoptera, those of *Cupes* will suggest homologies. In *Cupes* the anus opens at the apex of a tube which shows no demarcation between tergite and sternite. This anal tube (figs. 1, 10) is evidently composed of the tenth and eleventh segments. At the base of the tube on the ventral aspect there is a pair of flat appendages (fig. 1 d) which suggest cerci. This is the only case in Coleoptera in which any organs suggesting cerci are found in the male. The ninth tergite is deeply bilobed, the lobes laying above and along side the anal tube. The ninth sternite projects caudad so that the ædægus is considerably enfolded by the ninth segment. A large membrane connects the ninth segments and the normally formed eighth. The tegmen of the ædægus is not differentiated into lateral lobes and

(*) Trans. Ent. Soc. Lond., 1912, III p. 522, Pl. LIX figures 103, 103-a; 104, 104-a, 104-b.

basal piece unless we regard the spine-like process (figs. 2 and 3, c) as the lateral lobes and the large plates on each side (figs. 2 and 3, ll) as development of the basal piece. Near the middle of the ventral edge of these plates marked ll arise a long, thin spine (fig. 3, b), another unique structure in Coleoptera as far as the writers knowledge extends. On the dorsal aspect and arising from the basal ring of the tegmen there is a long, narrow plate with a bilobed apex (figs. 2 and 3, a). This can be compared to a similarly situated plate in *Enarsus bakewelli*, *Dascillus cervinus* and *Atractocerus africanus*, and such a plate amalgamated to the median lobe would produce such a form as is found in *Lissomus bicolor*. The functional orifice of the median lobe extends from the apex to the base of the ventral aspect, the edges being brought near together at the base, so that the median lobe does not form a tube.

In the larvæ of *C. concolor* the ninth sternite is short and posterior to it there are two large oval processes with a minute process at the apex of each. These strongly suggest coxites and styles. Unfortunately the only pupa Dr. Tillyard possessed was a female, the imago of which could be seen within the pupal skin and the styles of the adult lay within the styles of the pupa. The cerci were also present in the pupa. A pupa of a male in the same stage of development might throw light upon the homologies of the male genitalia.

Although the genitalia of *Cupes* is more complex than is found in most other Coleoptera, I am inclined to consider it as a primitive form. The line of evolution of the genitalia in Coleoptera is from a complex form to a simple. In some forms (i. e. *Paropsis variolosa*) the tegmen is nearly suppressed and the median lobe, along with an internal sac, forms the functional organ; often the remaining portion reaches great complexity (i. e. *Xantholinus*). In other forms (i. e. *Prostenus dejeani*) the median lobe is nearly suppressed and the tegmen is the chief structure. It would be easy to compare the tegmen of *Cupes* with the outer portion of the genitalia of aculeate Hymenoptera which, although more complex, I consider as more primitive. In some of the parasitic Hymenoptera, which are evidently highly modified forms, the ædœagus

